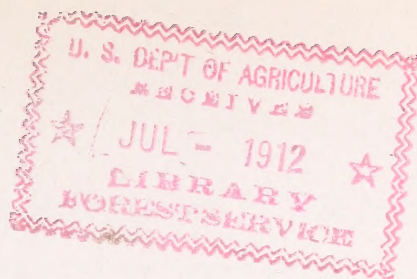


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THE GREENHOUSE THRIPS.

BY

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Entomological Assistant.

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United States Department of Agriculture,

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THE GREENHOUSE THIRPS.¹*(Heliothrips hæmorrhoidalis* Bouché.)By H. M. RUSSELL,
Entomological Assistant.

INTRODUCTION.

The greenhouse thrips has been the cause of considerable injury to ornamentals during the past century, and where its presence is not suspected or treatment is neglected it will cause the utter ruin of certain plants, in the greenhouse, grown principally for the beauty of their foliage. Likewise in the more tropical sections of the United States, such as southern Florida and southern California, this insect causes great damage to some outdoor plants.

DESCRIPTION AND LIFE HISTORY.

The adult of this thrips is a small, active insect about one twenty-fourth of an inch in length and dark brown in color, with the tip of the body decidedly lighter. The appearance of this insect is sufficiently illustrated in figure 1 to render a more detailed description unnecessary. This insect feeds on the foliage of the plant attacked and removes all the coloring matter, leaving the leaf white and, in severe cases of attack, dead. During this period the female deposits her eggs (fig. 2, *a*) within the leaf tissue and these hatch in the greenhouse in about eight days. The larva which hatches from the egg is a minute white insect of the shape indicated in figure 2, *b* and *c*. During this period, which requires from 10 to 20 days, varying with the temperature, the larvæ feed together in colonies on the surface of the leaf and remove the coloring matter in the same manner as do the adults. While engaged in feeding, the larva exudes a large drop of reddish fluid from

¹ For a fuller technical treatment of this insect see "The Greenhouse Thrips," Bul. 64, Pt. VI, Bur. Ent., U. S. Dept. Agr.

the anal end of the body, and when this becomes too heavy it drops to the leaf surface and dries into a black dot. Where the insects are numerous these exudations produce a marked discoloration of the foliage. Upon becoming full grown the larvæ change to the resting stages—prepupa and pupa (see fig. 3)—during which time they remain more or less motionless among the feeding young and take no food. These stages require periods of about four to six days, after which the adults emerge. Figure 5 shows a colony of pupæ on a leaf of croton. The total time required for this insect from the time the

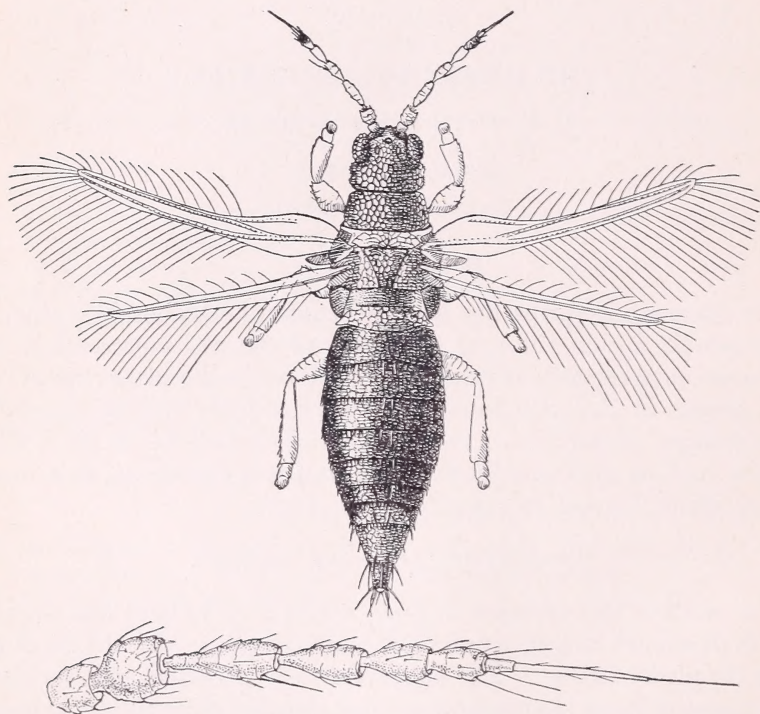


FIG. 1.—Greenhouse thrips (*Heliothrips hæmorrhoidalis*): Adult female, enlarged about 50 diameters, and greatly enlarged drawing of antenna underneath. (Author's illustration.)

egg is laid until the adult emerges ready to reproduce its kind is from 20 to 33 days, and as this insect continues active in the greenhouse the entire year many generations occur each year.

ORIGIN AND DISTRIBUTION.

Although this insect was first described from Europe and is there widely distributed, it is without doubt indigenous to tropical America. It has been recorded in the open in St. Vincent and Barbados. This insect has been collected at Miami, Fla., on plants in the open in midwinter. At Santa Barbara, Cal., it caused considerable damage to ornamentals in one of the parks in November.

These records of occurrences at several localities in the Tropical and Lower Austral life zones of this country point strongly to tropical America as its original home. This is further strengthened because of its well-known habit of living in greenhouses, in many localities, upon exotic plants from the Tropics. From this habit it has become widely distributed in Europe and North America. In Europe it is recorded from England, Germany, Austria, Russia, Finland, France, Spain, and Italy. It is also known to occur in Australia and the Hawaiian Islands.

In this country it is recorded from Massachusetts, from several places in Michigan, and from Washington, D. C., Florida, and California. It has been collected in Iowa and Pennsylvania and in the Barbados and the island of St. Vincent, British West Indies.

Because of the fact that it has been collected in such widely distant places in all sections of the country, we can safely say that *Heliothrips hæmorrhoidalis* is generally distributed in greenhouses throughout the United States.

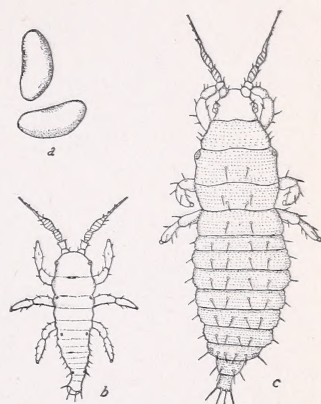


FIG. 2.—Greenhouse thrips: a, Egg; b, larva, first stage; c, larva, full grown. All enlarged about 40 diameters. (Author's illustration.)

NATURE AND EXTENT OF INJURY.

The damage caused by the greenhouse thrips to ornamental plants

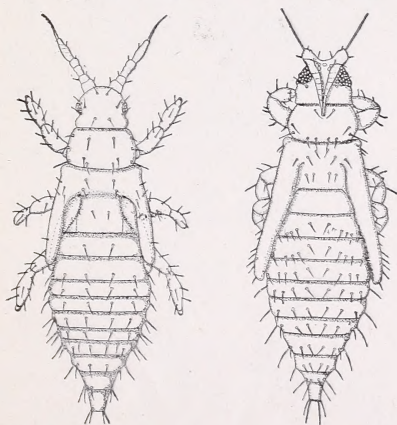


FIG. 3.—Greenhouse thrips: Prepupa on the left and pupa on the right. Enlarged about 40 diameters. (Author's illustration.)

is confined to the foliage entirely, in so far as the author is aware, for he knows of no recorded injury to the blossoms of the plants nor has he noticed any. The damage to fruits is divided between injury to the foliage and to the fruit itself. Injury effected by the thrips is due to the method of feeding on the plants. Both adults and larvæ obtain their food by puncturing the epidermis of the leaf or fruit with their sharp mouthparts,¹ and after lacerating the tissue they suck out the vegetable matter and plant juices at the point of attack. The insect

then attacks the leaf or fruit in a new place, so that in time it becomes full of tiny pale spots where the vegetable matter has been extracted.

¹ For structure of mouthparts see "The Pear Thrips," by Dudley Moulton, Bul. 68, Part I, Bur. Ent., U. S. Dept. Agr., pp. 2-3, 1907.

In the case of infested plants, injury is noticed first to the older leaves and gradually, as these become badly infested, the injury

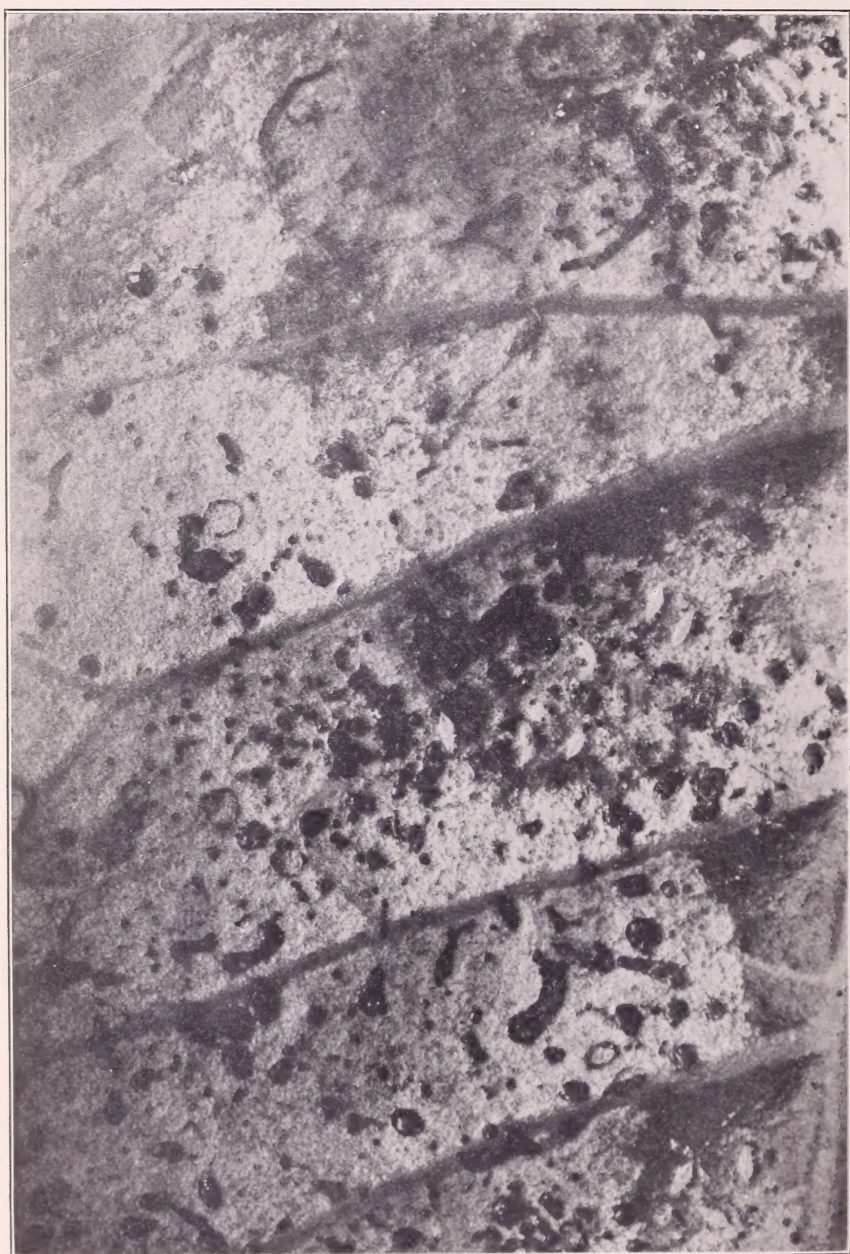


FIG. 4.—Portion of leaf of croton magnified to show pupæ of greenhouse thrips. (Original.)

spreads until the young leaves are attacked, soon after unfolding. The infested leaves first show injury on the underside, where the

epidermis appears full of minute white spots. As attack continues the spots become more numerous and unite, forming blotches where the leaf is damaged. Figures 4 and 5 shows leaves of croton badly



FIG. 5.—Croton leaves showing bleach and black and brown spots due to feeding of the greenhouse thrips. (Original.)

injured by this insect. The injury then becomes apparent from the surface and develops a twisted and distorted aspect between the lateral veins, and is finally evidenced by wilted and dead areas



FIG. 6.—Croton plant showing healthy appearance, Washington, D. C., December, 1911. (Original.)

around the edges of the leaf. In severe attacks the insects spread to the upper surface of the leaves, and in a short time this as well as the underside is nearly devoid of color. Both sides become thickly covered with minute drops of reddish fluid voided by the thrips, which gradually change to black. As the attack continues, the leaves become limp and yellow and eventually drop off, so that the plants that are not treated to prevent injury in many cases lose their entire foliage. Figure 6 shows normal croton and figure 7 croton totally defoliated by the adults of this insect.

This insect injures plants in two ways: First, a serious drain on the vitality of the plant is produced by the feeding of thousands of thrips, so that the growth is seriously checked and in neglected cases causes the death of the plant. Second, it destroys the beauty of the plants for ornament by eventually despoiling them of their foliage.

In southern Florida this insect attacks the mango and alligator pear and causes great injury by feeding on the foliage and it may also cause injury by feeding on the young fruit and scarring it to a large extent.

At Santa Barbara, Cal., this insect occasionally becomes so abundant on orange trees as to ruin the fruit and cause the entire foliage to drop. The guava industry there has also suffered severely from this insect.



FIG. 7.—Croton plant totally defoliated by the greenhouse thrips, Washington, D. C., February, 1912. (Original.)

FOOD PLANTS.

The greenhouse thrips feeds on a large number of ornamental plants. In this country it has been recorded as feeding on liliaceous plants, azalea, *Pellea hastata*, aspidium, croton, dahlia, phlox, verbena, pink, ferns, vines, cherry laurel (*Prunus caroliniana*), laurastina, palms, Ficus, and fuchsia. In California it has been found on raspberry, guava (*Psidium guajava*), and orange. This thrips damages the mango (*Mangifera indica*), alligator pear (*Persea gratissima*), and maple in Florida, and has been recorded from St. Vincent and the Barbados on cacao (*Theobroma cacao*), kola, and the date palm (*Phoenix dactylifera*). In Europe this thrips has been recorded as preying upon ærides, azalea, begonia, camarotes, cattleya, crinums, dendrobium, eucharis, Ficus, grape, lælia, lefortia, marcintacia, pancratium, phalenopsis, banana, and viburnum. In Australia it is recorded as occurring on different species of eucalyptus.

REMEDIES.

For the treatment of this pest there are a number of good remedies. The question as to the best method to employ depends upon the size of the greenhouse infested and upon the experience of the person engaged in treating the insect.

Fumigation with nicotine papers.—Any of the standard fumigating papers will give good results against this pest if they are strictly fresh and kept tightly sealed. Fumigation should be done at night in a moist atmosphere, and the papers should be used at the rate of about 2 sheets for every 1,000 cubic feet of space. Early in the morning the house should be opened and thoroughly aired.

Fumigation with nicotine liquid extracts.—Liquid extracts of nicotine offer one of the best methods of greenhouse fumigation and against this pest are very successful. Those made up of 40 per cent nicotine should be used at the rate of 1 ounce to every 1,000 cubic feet of space and the weaker solutions at greater strengths. The preparation should be evaporated over small lamps or stoves, and to prevent scorching should be diluted with water, approximately two-thirds. Fumigation should be carried on at night in a moist atmosphere, and the greenhouse should remain closed all night.

*Fumigation with hydrocyanic-acid gas.*¹—When fumigating with hydrocyanic-acid gas great care should be taken, as this gas is fatal to all animal life. The work must be conducted at night, and the plants should have dry foliage. In treating this insect, use from 0.01 to 0.05 gram of potassium cyanid per cubic foot for from two hours to all night, the strength and length of exposure varying according to the tightness of the house and the kind of plants that are being

¹ For complete directions for the use of hydrocyanic-acid gas, see Cir. 37 and 57, Bur. Ent., U. S. Dept. Agr.

treated, as there is considerable difference between various plants in their resisting power to this gas.

Spraying with nicotine liquids.—Nicotine extracts diluted with water, if carefully applied to plants, will kill large numbers of the greenhouse thrips, but the great objection is that many of the insects are not hit by the spray, and therefore the plants become reinfested in a short time.

*Spraying with kerosene emulsion.*¹—It is quite possible that kerosene-emulsion spray will be effective against the greenhouse thrips when used at the strength of 1 part of stock to 10 parts of water, and it costs considerably less and is more readily obtained than the nicotine preparations. It should be very carefully prepared and used experimentally at first until the effect on the foliage of the different plants is noted. Care should also be taken to prevent quantities of emulsion from collecting around the roots.

Water spray.—Frequent treatment with a stiff spray of water from a garden hose or syringe will tend to keep this insect down, but unless there are only a few plants it would be better to use one of the other remedies.

Any treatment for this insect should be repeated in from 7 to 10 days to destroy the young larvæ that have hatched from the eggs. This should be sufficient, but it may be best to give a third treatment in another week or two.

Treatment of trees in the open.—In the case of injury to the various subtropical fruits it is recommended to spray the foliage thoroughly with a nicotine spray. A tobacco extract of $2\frac{3}{4}$ per cent of nicotine sulphate, diluted at the rate of 1 part to 60 parts in a 6 per cent distillate-oil emulsion, has given such good results against the pear thrips that this treatment should be tried.²

Approved:

JAMES WILSON,

Secretary of Agriculture.

WASHINGTON, D. C., April 19, 1912.

¹ For the method of making emulsions, see Farmers' Bulletin 127, or Cir. 80, Bur. Ent., U. S. Dept. Agr.

² Full directions for mixing this spray are given in Cir. 131, Bur. Ent., U. S. Dept. Agr., pp. 8-9.

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